system, which allows the decoded audio and video data to be output to the screen or speakers. For video playback, the system uses a UDP-based Adaptive Bitrate algorithm, which dynamically adjusts the bitrate of the video according to the network conditions to ensure smooth and high-quality playback. The control of audio and video is coordinated by a signaling server that coordinates the audio and video transmission among the clients. For example, in a multi-participant conference, it is necessary to control the reception and transmission of each participant's audio and video streams to ensure the quality and stability of the conference.

The results of the research show that the solution can achieve faster, more stable and real-time video transmission and communication results under good network environment or unstable conditions. Compared with the traditional centralized video conferencing solution, this solution has better scalability and robustness, and can meet a wider range of application requirements.

References

1. Wang Yuanjing. An introduction to the advantages and disadvantages of WebRTC in new media live video distribution[J]. Modern TV Technology. 2022. Vol. 33(09). P. 146–148.
2. What is WebRTC. [Electronic resource]. – Access mode: https://trueconf.com/webrtc.html.
3. Peer to Peer Networks. [Electronic resource]. – Access mode: https://www.tutorialspoint.com/peer-to-peer-networks.

УДК 004

ANALYSIS OF ACCELEROMETER SIGNALS IN HUMAN PHYSICAL ACTIVITIES

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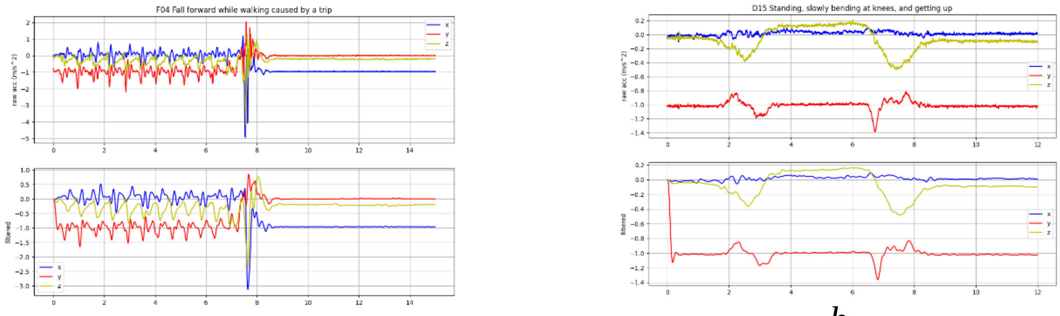
Summary. *This paper examines accelerometer signals related to physical activity. It involves a meticulous analysis of acquired data during the preprocessing stage and utilizes a range of indicators to determine the most suitable data management parameters. This data analysis plays a pivotal role in preprocessing human sensor data, as selecting appropriate parameters can significantly enhance the accuracy of activity prediction.*

The algorithm for the proposed model was developed using the Sisfall public dataset, a unique resource containing 15 predefined falls and 19 activities of daily living (ADLs) performed by 38 subjects, all equipped with waist-mounted sensors. The dataset is notable for its tailored inclusion of ADL activities, such as walking, jogging, sitting, and standing, specifically designed for older adults. With a sampling frequency of 200 Hz, the dataset covers subjects aged 19 to 75 and employs accelerometers at the waist for data collection.

Since the accelerometer data results will seriously affect the recognition quality, the accelerometer data is selected for analysis and preprocessing during data processing. Figure 1 shows an example of the fall and 3-axis acceleration curves of the ADL recorded in the Sisfall dataset. Fig. 1, *a* is the fall acceleration data, and fig. 1, *b* is the daily life acceleration data.



a *b*

Figure 1 – Fall and ADL acceleration data

In order to analyze and determine the cutoff frequency and the best filter selection criteria, I selected multiple metrics to determine and the final preprocessing stage consists of a fourth-order Butterworth low-pass filter with a cutoff frequency of 5 Hz.

After comparing and analyzing multiple criteria, this paper selects the energy ratio as the best indicator for selecting the cutoff frequency, as shown in the following fig. 2:

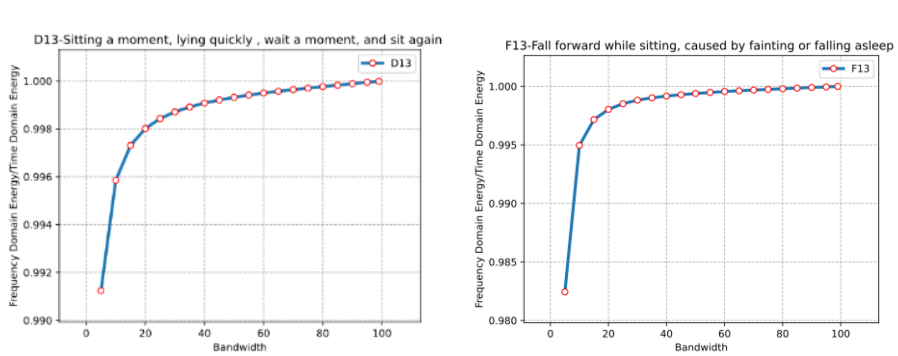


Figure 2 – The curve graph of the energy ratio of Fall and ADL

At the same time, the choice of our filter is also very important, in digital signal processing, especially accelerometer data processing there are multiple filters for us to choose from, such as Bessel, Chebyshev and Butterworth filters, and the order of the filter also affects the quality of the filtered data. After testing, we select MSE indicators, signal-to-noise ratio and energy indicators to select the type and order of filters.

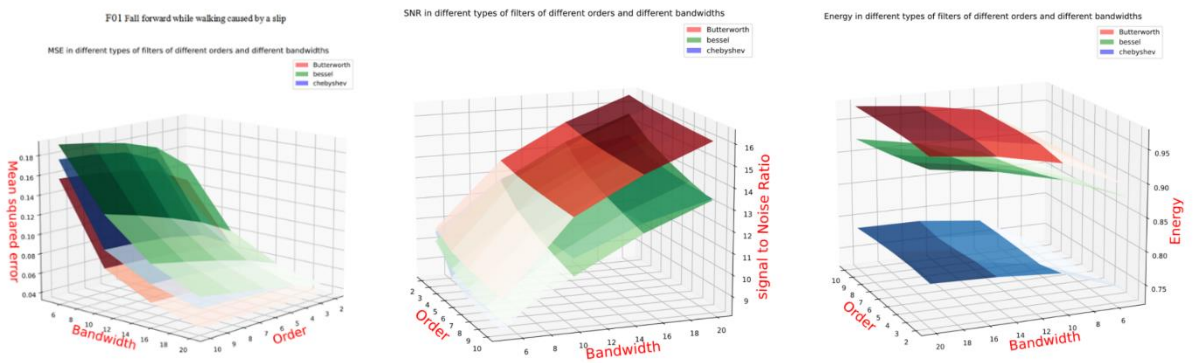


Figure 3 – Comparison of different metrics of different filters under different orders and different bandwidths of Fall

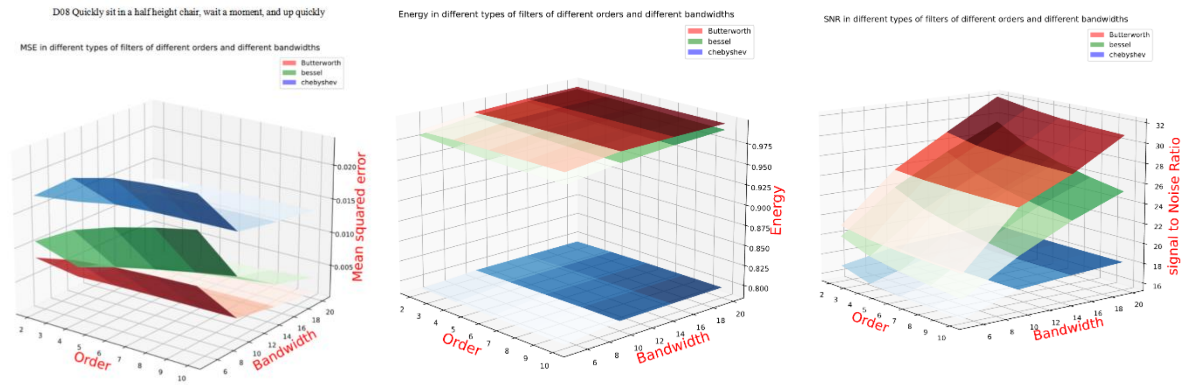


Figure 4 – Comparison of different metrics of different filters under different orders and different bandwidths of ADLs

From fig. 3 and fig. 4, we can see that the Butterworth filter is always optimal under different metrics and different parameters. So we chose the Butterworth filter as the best filter for the data preprocessing stage.

УДК 338

MULTIPLE SENSORS

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Summary. *The paper discusses an advanced human fall detection algorithm that utilizes data from multiple sensors, specifically acceleration sensors and video sensors, to enhance fall risk management for high-risk groups like the elderly and those with limited mobility. The key innovation in this research is the integration of multiple sensors, which enhances the accuracy and reliability in differentiating between genuine falls and non-fall activities. This advancement significantly enhances the safety of individuals who are at a high risk of falling.*

Due to the impact of global pandemics and the aging population issue, fall injuries have become a primary cause of accidental harm for both underlying patients and the elderly. While many video sensors and acceleration sensors have